

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

1. Specifically, Claims 1-8 appear to define an apparatus using "means plus function" claim language. However, the specification does not disclose corresponding physical structure associated with each claim element, and the specification does indicate that the invention may be embodied as pure software (Specification, pg 6, In 26-32: where implementation is said in the alternative to be able to be implemented by a processor - also states "functions are performed under control of a software program product" - this program is not stated to reside upon a computer readable medium but instead "normally" may be loaded in memory. Also, loading can alternatively be done via the "internet"). Therefore, the claim as a whole appears to be nothing more than a collection of software elements and the Examiner fails to see where there is support in the specification showing corresponding structure.

Claims 2 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

2. Specifically, claim 2 recites "a relatively high relevance value...if an angle between...first...and second...is relatively small". At what value or range of values is the relevance value considered high? At what value or range of values is the angle considered small? Both values are stated to be relative but the Examiner is not certain to what reference either value is relative to.

3. There is a similar issue with claim 6. Also, with regards to claim 6, "steepness" is recited with reference to a first edge. The Examiner is unsure whether "steepness" refers to a gradient transition or an edge orientation angle or otherwise.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows (see also MPEP 2106):

Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to

support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See *Lowry*, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

4. **Claims 1-8 are rejected under 35 U.S.C. 101** because the claimed invention is directed to non-statutory subject matter as follows. Claims 1-8 appear to define an apparatus using "means plus function" claim language. However, the specification does not disclose corresponding physical structure associated with each claim element, and the specification does indicate that the invention may be embodied as pure software (Specification, pg 6, In 26-32: where implementation is said in the alternative to be able to be implemented by a processor - also states "functions are performed under control of a software program product" - this program is not stated to reside upon a computer readable medium but instead "normally" may be loaded in memory. Also, loading can alternatively be done via the "internet"). Therefore, the claim as a whole appears to be nothing more than a collection of software elements, thus defining functional descriptive material per se.

Functional descriptive material may be statutory if it resides on a "computer-readable medium or computer-readable memory". The claims indicated above lack

structure, and do not define a computer readable medium and are thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests:

1. Amending the claim(s) to embody the program on "computer-readable medium" or equivalent; assuming the specification does NOT define the computer readable medium as a "signal", "carrier wave", or "transmission medium" which are deemed non-statutory (refer to "note" below); or

2. Pointing out where the corresponding structure can be found in the specification that would clearly be indicative of a statutory apparatus, in a 112 6th paragraph sense.

Any amendment to the claim should be commensurate with its corresponding disclosure.

5. **Claim 10 is rejected under 35 U.S.C. 101** because the claimed invention is directed to non-statutory subject matter as follows. Claim 10 defines a computer program product, embodying functional descriptive material (i.e., a computer program or

computer executable code). However, the claim does not define a "computer-readable medium or computer-readable memory" and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). The scope of the presently claimed invention encompasses products that are not necessarily computer readable, and thus NOT able to impart any functionality of the recited program. The examiner suggests amending the claim(s) to embody the program on "computer-readable medium" or equivalent; assuming the specification does NOT define the computer readable medium as a "signal", "carrier wave", or "transmission medium" which are deemed non-statutory (refer to "note" below). Any amendment to the claim should be commensurate with its corresponding disclosure.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7 and 9-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamada (US Pub. No. 2002/0071600 A1).

6. **Regarding claim 1**, Yamada discloses a pixel relevance determining unit (100) for determining relevance values for respective pixels of an image ([0031]: characteristic calculation unit), the pixel relevance determining unit (100) comprising: - edge determining means (102) for determining a first edge orientation for a first one of the pixels (300) on basis of a first group of pixel values and for determining a second edge orientation for a second one of the pixels (308) on basis of a second group of pixel values, the second one of the pixels (308) being located in a neighborhood of the first one of the pixels (300) ([0060]: index values are obtained which include pixel vector information at each pixel – See also Fig. 6 (a-c) where it is observed that pixel vectors are adjacent to each other and in a local neighborhood); and assigning means (104) for assigning a first one of the relevance values corresponding to the first one of the pixels (300), on basis of comparing the first edge orientation with the second edge orientation (Fig. 6 (b-c): comparison of pixel edge vectors result in the relevance value "Edge Confidence").

7. **Regarding claim 2**, Yamada discloses the pixel relevance determining unit (100) as claimed in Claim 1 and further teaches wherein the assigning means (104) is arranged to assign a relatively high relevance value to the first one of the pixels (300) if an angle between the first edge orientation and the second edge orientation is relatively small (Fig. 6 (b-c): Edge Confidence is increased in Fig. 6c where vector angle differences are small (matching)).

8. **Regarding claim 3**, Yamada deals with preserving edges as represented in a radiograph. A Radiograph is a grey scale image or monochrome. Monochrome is known in an instance to define a single color representation. In grey scale, varying degrees of grey are directly represented by variations in intensity. Intensity in a grey scale image is also known to be described in terms of luminance.

Yamada discloses the pixel relevance determining unit (100) as claimed in Claim 1 and further teaches wherein the first group of pixel values corresponds to respective luminance values of a first group of pixels (302-316) surrounding the first one of the pixels (300) (¶ [0052 and 0056]: in a "neighborhood of the pixel" and "pixel energy" (intensity), respectively).

9. **Claim 4 is rejected** for the same reasoning as previously presented with regards to claim 3.

10. **Regarding claim 5**, Yamada discloses the pixel relevance determining unit (100) as claimed in Claim 1, wherein the edge determining means (102) comprises a high pass filter (¶ [0091]: Laplacian pyramid decomposition includes high pass bands).

11. **Regarding claim 6**, Yamada discloses the pixel relevance determining Unit (100) as claimed in Claim 2 and further teaches wherein the assigning means (104) is arranged to assign a relatively low relevance value to the first one of the pixels (300) if a

steepness of a first edge corresponding to the first one of the pixels (300), is below a predetermined threshold (¶ [0147-0149]: the index E of pixel energy is assigned as $(V_e/Th)^2/2$ when V_e (pixel energy at each pixel) < Th). The Examiner understands steepness as recited in the instant claim to refer to the intensity of a pixel.

12. **Regarding claim 7**, Yamada discloses the image processing apparatus (400) comprising: receiving means (402) for receiving a signal representing an image (¶ [0084]: "unit 1 receives an input image signal S_{in} "); a pixel relevance determining unit (100) for determining relevance values for respective pixels of the image, the pixel relevance determining unit (100) as claimed in Claim 1 (¶ [0106]: index-value obtaining unit); and filtering means (204) for (¶ [0152]: "adaptive filter based on the degree C of edge confidence...") computing an output image (¶ [186]: "adder...outputs the processed image signal S_{proc} ") on basis of the image and on basis of the relevance values.

13. **Claim 9 is rejected** for the same reasoning as previously presented with regards to claim 1.

14. **Claim 10 is rejected** for the same reasoning as previously presented with regards to claim 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada.

15. **Regarding claim 8**, Yamada discloses the image processing apparatus (400) as claimed in Claim 7 in which particular relevance value is assigned to a particular pixel, but fails to disclose wherein the filtering means comprises peaking means, a peaking gain of the peaking means for a particular pixel of the image depending on a particular relevance value being assigned to the particular pixel.

Yamada filters his image by smoothing along the edge orientations in order to both reduce noise and preserve recognized edges. Once an edge has been identified, as Yamada does by comparing neighboring pixel characteristics which include pixel vector information, there are many known methods of enhancing the edge. For example, an unsharp mask can be used which would implement a high pass filter on an original image and then combine the high-passed image with a corresponding smoothed or low-pass filtered image; or Sobel operators can be used in order to pass the edge components.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include in the method as taught by Yamada which includes a particular relevance value being assigned to the particular pixel, a filtering means comprising a peaking means, a peaking gain of the peaking means for a particular pixel of the image depending on a particular relevance value being assigned to the particular pixel, to apply a known technique of high passing an edge component (eg. through the use of the well known Sobel operator), for improving visualization of edges which would be a predictable result.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to THOMAS A. CONWAY whose telephone number is (571)270-5851. The examiner can normally be reached on Monday through Friday 8AM - 5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 571-272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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